

II. REMARKS

As an initial matter, Applicants renew their traversal of the Examiner's Restriction Requirement, outlined in the Office Action of July 12, 2007, for the reasons evinced in Reply (B), filed August 13, 2007, which is incorporated herein by reference. Furthermore, Applicants gratefully acknowledge the Examiner's determination that all generic claims and linking claims will be rejoined with allowed generic or linking claims (Office Action, dated September 25, 2007, at 2, lines 10-13).

Claims 2, 3, 6-11 and 14 have been withdrawn, and claims 1, 4, 5, 12, 13 and 15 have been examined.

By the present amendment, claim 1 been amended and new claims 16-21 have been added. More specifically, claim 1 has been amended to recite "wherein the tool body has a length and a radius and is cylindrical in shape" as supported by Figures 1 and 4-7, and as described on page 12, line 21, to page 13, line 5, of Applicants' disclosure as originally filed.

New claim 16 depends on claim 1, and additionally recites "wherein the length of the cylindrical tool body is substantially greater than the radius of the cylindrical tool body" as shown in Figures 4-7 of Applicants' disclosure as originally filed. New claim 17 depends upon claim 1, and additionally recites "wherein the cylindrical tool body has a cavity formed therein and opening on one end of the cylindrical tool body so as to form a tubular portion, and the drum-shaped tool is disposed in the cavity so as to rotate about the orthogonal axis x" as shown in Figures 4-7 and 10 of Applicants' disclosure as originally filed. New claim 18 depends upon claim 17 and additionally recites "wherein the drum-shaped tool has a first groove formed therein on a first side" as shown by Figures 4, 5 and 10 of Applicants' disclosure as originally filed. New claim 19 depends upon claim 18 and additionally recites "wherein the drum-shaped tool has a second groove formed therein on a second side" as shown by Figures 4, 5 and 10 of Applicants' disclosure as originally filed.

New claim 20 depends upon claim 19, and additionally recites “wherein the drum-shaped tool has hole formed therein that extends along the orthogonal axis x, and a shaft and bearing are disposed in the hole so that the drum-shaped tool rotates about the orthogonal axis x and substantially within the cavity of the cylindrical tool body” as shown by Figures 4, 5, 7 and 10 of Applicants’ disclosure as originally filed. New claim 21 depends upon claim 13 and additionally recites “wherein the cylindrical tool body has a cavity formed therein at one end, and the drum-shaped tool is disposed in the cavity so as to rotate about the orthogonal axis x, and at least a portion of the correction means is disposed on a surface of the tool body defining the cavity so that the correction means corrects the convex machining surface of the drum-shaped tool” as shown in Figures 4, 5, 6, 7 and 10 of Applicants’ disclosure as originally filed.

The present amendment adds no new matter to the above-captioned application.

A. The Invention

The invention pertains broadly to a free curved surface precision machining tool for precision-machining a surface to be machined, such as may be used to machine a surface. In accordance with an embodiment of the present invention, a free curved surface precision machining tool for precision-machining a surface to be machined is provided that includes the features recited by independent claim 1. Various other embodiments, in accordance with the present invention, are recited by the dependent claims.

An advantage provided by the various embodiments, in accordance with the present invention, is that a free curved surface precision machining tool for precision-machining a surface is provided that is capable of precision machining a free curved surface using a versatile 3-axis (x, z, r) NC machining apparatus.

B. The Rejections

Claims 1, 4, 5, 12, 13 and 15 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

Claims 1, 4 and 12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Hess et al. (U.S. Patent 4,958,463, hereafter the “Hess Patent”) in view of Nisimura (U.S. Patent 3,953,942, hereafter the “Nisimura Patent”). Claims 5, 13 and 15 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Hess Patent in view of the Nisimura Patent, and further in view of Ohmori et al. (U.S. Patent 6,056,629, hereafter the “Ohmori Patent”).

Applicants respectfully traverse the Examiner’s rejections and request reconsideration of the above-captioned application for the following reasons.

C. Applicants’ Arguments

i. The Indefiniteness Rejection

In view of the present amendment, claims 1, 4, 5, 13 and 15-21 are in compliance with 35 U.S.C. § 112. Applicants additionally draw the Examiner’s attention to the following.

The Examiner contends that the limitation “the tool body” has no proper antecedent basis (Office Action, dated July 11, 2008, at 2, line 23, to 3, line 1). The antecedent basis for the limitation “the tool body” in lines 5-6 of claim 1 is the preamble of the claim (i.e., line 3 of claim 1). It is a well-settled proposition that the preamble of a claim may provide antecedent basis for limitations recited in the body of the claim. See, e.g., Catalina Marketing International v. Coolsavings.com Inc., 62 U.S.P.Q.2d 1781, 1785 (Fed. Cir. 2002).

The Examiner further contends that it is unclear whether “the tool body” is the “drum-shaped tool” or the “frame” that holds the drum-shaped tool (Office Action, dated July 11, 2008, at 3, lines 1-2). Applicant disagrees. Applicants’ disclosure as originally filed clearly

describes a “tool body” (11) that is a separate and distinct element from the “drum-shaped tool” (12) as shown in Figure 11, and as described on page 12, line 21, to page 13, line 17, of the specification. A person of ordinary skill in the art would not find any ambiguity with regards to the fact that the “tool body” and the “drum-shaped tool” are different elements of Applicants’ invention.

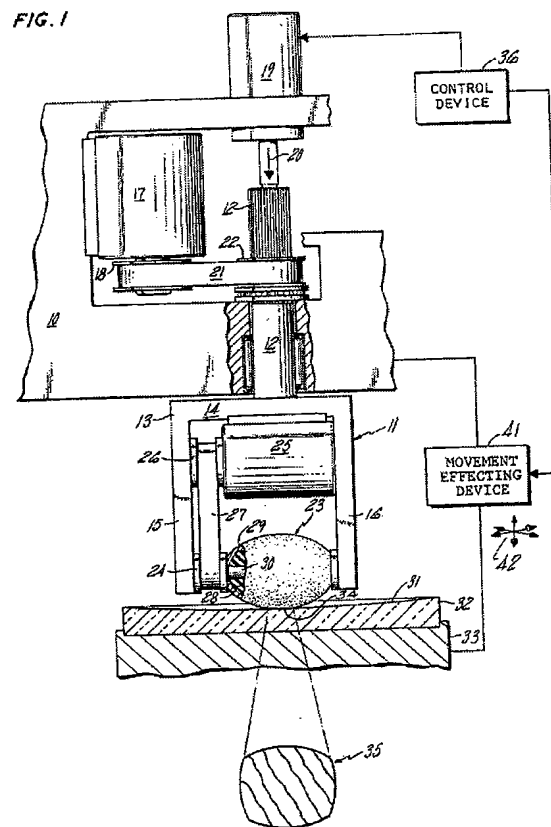
For all of the above reasons, claims 1, 4, 5, 13 and 15-21 are in compliance with 35 U.S.C. § 112.

ii. The Section 103 Rejection

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation, or other reason, for combining the references in the manner claimed. KSR International Co. v. Teleflex Inc., 127 S.Ct. 1727, 1739-41 (2007); In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). In this case, the Examiner has failed to establish a prima facie case of obviousness because the Examiner has not shown that the combination of the Hess Patent, the Ohmori Patent and the Nisimura Patent teach each and every element of the claimed invention arranged as in the claims. The Examiner has also failed to establish a prima facie case of obviousness against Applicants’ claimed invention because the Examiner has failed to show that a person of ordinary skill in the art would have had a reasonable expectation of success of arriving at the invention if the combination of Hess, Ohmori and Nisimura was made, and because the Examiner has failed to establish a legitimate reason to justify the combination of the Hess Patent, the Ohmori Patent and the Nisimura Patent.

iii. The Hess Patent

The Hess Patent discloses an “optical surface quality improving arrangement” as shown in Figure 1, reproduced below for convenience, which includes a mounting member (11) mounted on a support (10) for movement relative thereto at least in and opposite to a predetermined direction toward and away from the effective surface and a working member (23) that is caused to rotate relative to the mounting member (11) about a rotational axis that extends substantially normal to the predetermined direction (See Abstract of the Hess Patent).



A pressing force acting in the predetermined direction is applied to the mounting member (11) according to the Hess Patent so that successive regions of an outer circumferential surface of the working member (23), which is centered on the rotational axis, act on a predetermined zone of the effective surface (31) of the workpiece (32) during the rotation of the working member (23) with local pressures dependent on the magnitude of the pressing

force and sufficient to remove material from the workpiece (32), (See Abstract of the Hess Patent). The Hess Patent discloses that the predetermined zone is caused to move over the effective surface, and at least one of the pressing force and the rate of such movement is so controlled that the material of the workpiece is removed from any area of the effective surface while the successive regions of the outer circumferential surface of the working member act thereon to such a depth that the effective surface obtains its desired configuration (See Abstract of the Hess Patent).

As admitted by the Examiner (Office Action, dated July 11, 2008, at 3, lines 19-24; Office Action, dated February 13, 2008, at 4, lines 5-9), the Hess Patent does not teach, or even suggest, (i) “a driven gear disposed on both sides or one side of the drum-shaped tool,” and (ii) “a main driving gear disposed to drive the driven gear” as recited by claim 1. The Examiner also admits that the Hess Patent does not teach, or suggest, (iii) “the convex machining surface is provided by the grindstone that includes a metal in a bonding material of the grindstone” as recited by claim 5 and (iv) “correction means for correcting the convex machining surface of the drum-shaped tool” as recited by claim 13 (Office Action, dated July 11, 2008, at 4, lines 13-16). However, these are not the only deficiencies in the Hess Patent. The Hess Patent also does not teach, or suggest, (v) “wherein the tool body has a length and a radius and is cylindrical in shape” as recited by claim 1. Furthermore, the Hess Patent does not teach, or suggest, the subject matter of new claims 16-21.

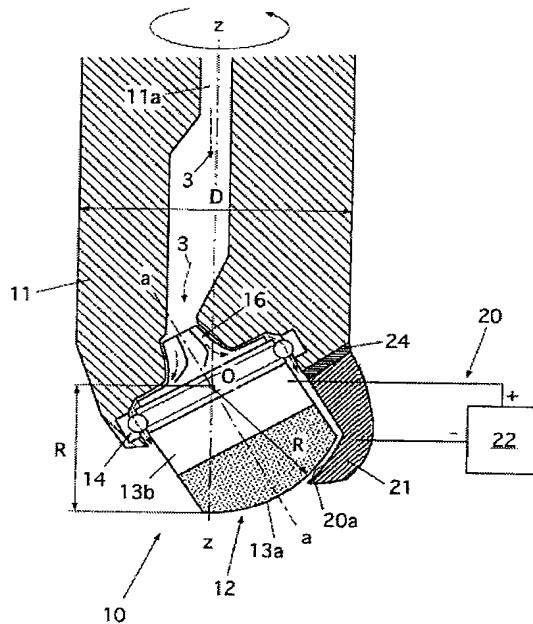
iv. The Ohmori Patent

The Ohmori Patent discloses a “free form machining tool” (10) as shown in Figure 2 that includes a spherical tool (12) that has a spherical surface machining section (13a) that is a grinder including a metal as its bonding material (Ohmori Patent, col. 3, lines 35-42).

Figure 2 of the Ohmori Patent is reproduced below for the Examiner’s convenience.

Figures 3, 4 and 5 of the Ohmori Patent illustrate additional embodiments. However, the various embodiments disclosed by the Ohmori Patent fail to teach, or even suggest, “the drum-shaped tool has a first groove formed therein on a first side” as recited by claim 18 and “the drum-shaped tool has a second groove formed therein on a second side” as recited in claim 19 of the present application. As described on page 14, lines 14-24, and as shown in Figure 4, of Applicant’s disclosure, the “drum-shaped tool” is provided with one or more grooves for receiving an impeller (15), which is used to rotate the drum-shaped tool and which permits a jet of fluid to flow around the drum-shaped tool.

Fig.2

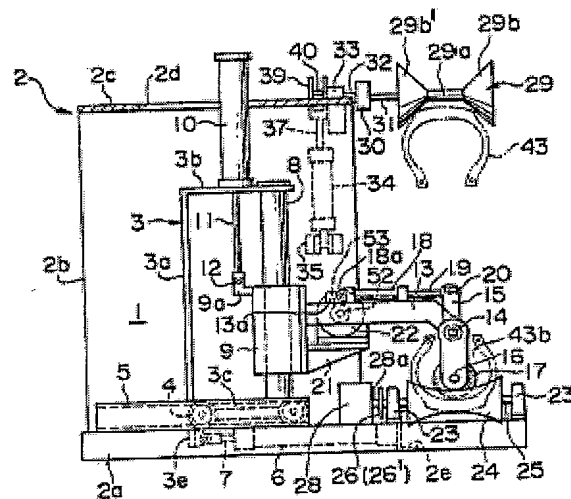


The Ohmori Patent does not teach, or suggest, the “first groove” and the “second groove” of Applicants’ claimed invention. As described by Ohmori, at col. 3, lines 48-58, a “gap” is provided “between the balls” of the bearing (14) as shown in Figure 2 so as to allow cutting fluid (3) to pass. The Ohmori Patent does not teach, or suggest, providing a tool (12) with any grooves so that cutting fluid may pass through the grooves.

v. The Nisimura Patent

The Nisimura Patent discloses an “apparatus for grinding inner surface of a vehicle tire” that is used to grind the inner surface of a vehicle tire together with a mold releasing agent for amending an unbalanced portion on the tire and scars on the inner surface of the tire (See Abstract of the Nisimura Patent). The Nisimura Patent illustrates the apparatus for grinding an inner surface of a vehicle tire (43) in Figure 1, which is reproduced below.

FIG. 1



The Nisimura Patent discloses that the apparatus in Figure 1 comprises a frame structure (2), a horizontal supporting member (13) mounted on the frame structure (2), a swing member (15) pivotally mounted on the forward end portion of the supporting member (13), a grinder wheel (17) rotatably mounted on the lower end portion of the swing member (15), a swing member swinging mechanism (18, 19) mounted on the supporting member (13) for swinging the swing member (15) about its own axis, a grinder wheel rotating mechanism (See Figures 3 and 4) mounted on the supporting member (13) and the swing member (15) for rotating the grinder wheel (17), a tire rotating mechanism (24, 25, 28) mounted on the frame structure (2) opposing to the grinder wheel (17) for holding and rotating the vehicle tire (43) at a predetermined peripheral speed, a grinder wheel moving mechanism (3, 6, 7)

mounted on the frame structure (2) for relatively moving the supporting member (13) and the tire rotating mechanism (24, 25, 28) to move the grinder wheel (17) toward or away from the inner surface of the vehicle tire (43) on the tire rotating mechanism (See Abstract of the Nisimura Patent, and col. 3, line 37, to col. 6, line 39).

The Nisimura Patent does not teach, or even suggest, (i) “by rotation around a vertical axis z of a tool body of the precision machining tool” as recited by the preamble of independent claim 1. The Nisimura Patent also does not teach, or suggest, (ii) “an orthogonal axis x orthogonal to the vertical axis z of the tool body” and (iii) “the drum-shaped tool has a convex machining surface in the form of an arcuate rotary body obtained by rotating an arc of radius r with the center of the arc at the intersection O between the vertical axis z and the orthogonal axis x around the orthogonal axis x” as recited by independent claim 1. The Nisimura Patent additionally does not teach, or suggest, (iv) “wherein the tool body has a length and a radius and is cylindrical in shape” as recited by claim 1. The Nisimura Patent also does not teach, or suggest, the subject matter recited by new claims 16-21.

As admitted by the Examiner (Office Action, dated July 11, 2008, at 4, lines 11-15; Office Action, dated September 25, 2007, at 4, lines 2-5), the Nisimura Patent also does not teach, or suggest, (v) a “grindstone that includes a metal in a bonding material of the grindstone” as recited by claim 5, and (vi) “correction means” as recited by claim 13.

vi. Summary of the Disclosures

The Hess Patent discloses an optical surface quality improving arrangement that, as admitted by the Examiner, does not include (i) “a driven gear disposed on both sides or one side of the drum-shaped tool,” (ii) “a main driving gear disposed to drive the driven gear,” and (iii) “wherein the tool body has a length and a radius and is cylindrical in shape” as recited by claim 1. The Hess Patent also does not teach, or suggest, “the tool body has a

length and a radius and is cylindrical in shape” as recited by independent claim 1 and it does not teach, or suggest, the subject matter recited by new claims 16-21.

The Ohmori Patent discloses a free form machining tool that includes a spherical tool having a spherical surface machining section that is a grinder that includes a metal as its bonding material

The Nisimura Patent discloses an apparatus for grinding an inner surface of a vehicle tire that includes a drive mechanism connecting an electric motor to a grinder wheel so that torque generated by the electric motor is used to rotate the grinder wheel. However, the Nisimura Patent does not teach, or suggest, “wherein the tool body has a length and a radius and is cylindrical in shape” as recited by independent claim 1. The Nisimura Patent also does not teach, or suggest, the subject matter recited by new claims 16-21.

In view of the above facts, the combination of the Hess Patent, the Ohmori Patent and the Nisimura Patent still fails to teach, or suggest, “the drum-shaped tool has a first groove formed therein on a first side” as recited by claim 18 and “the drum-shaped tool has a second groove formed therein on a second side” as recited in claim 19 of the present application. For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against claims 18 and 19 of the above-captioned application.

vii. No Reasonable Expectation of Success of Arriving at Applicants’

Claimed Invention by Combining Hess, Ohmori and Nisimura

A proper rejection under Section 103 requires showing (1) that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process, and (2) that the person of ordinary skill in the art would have had a reasonable expectation of success in doing so. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, even assuming

arguendo that there is a legitimate reason to combine the disclosures of the Hess Patent, the Ohmori Patent and the Nisimura Patent (which is not a valid assumption), a person of ordinary skill in the art would have no clue how to reasonably re-engineer the disparate structures disclosed by these three patents to arrive at Applicants' claimed invention.

Specifically, the Hess Patent discloses a bulky apparatus for improving the surface quality of optical components, which includes a working member (23) held between two arms (15) and (16), (Hess Patent, Figure 1, and col. 5, lines 21-28). The working member (23) comprises a "compliant or elastically yieldable material" (28), such as polyurethane foam, and an "outer layer or sheath 29 of a material which is at least flexible and has good wear resistance" (Hess Patent, col. 5, lines 55-68). A person of ordinary skill in the art would instantly realize that the apparatus disclosed by Hess is used for polishing an optical surface and is not a tool used for machining.

The Nisimura Patent discloses another bulky apparatus, which is used to grind the inner surface of a tire (Nisimura Patent, Figures 1, 2 and 8). Nisimura's apparatus employs a grinder wheel (17) that protrudes from the side of swing member (15) as shown in Figures 3 and 4.

The Ohmori Patent discloses a free form machining tool that employs a spherical tool (12) and a bearing (14) mounted on a tool body (11) as shown in Figure 4. The structure disclosed by Ohmori is completely different from that of the Hess Patent and the Nisimura Patent as evident by comparison of the drawings of each patent. A person of ordinary skill in the art would have no idea how to integrate the disparate structures disclosed by these three patents. Therefore, the Examiner has not demonstrated that a person of ordinary skill in the art would have had a reasonable expectation of success of arriving at the invention recited by Applicants' claims even if the combination of Hess, Ohmori and Nisimura was made.

As apparent from Figure 1 and 5 of the above-captioned application, the "tool body" of the present invention corresponds to the tool body of, for example, a ball nose grindstone or a

ball end mill. Therefore the cross section of the tool body is a circle and the diameter is small so as to match the size of the ball nose grindstone or the ball end mill. This feature of the present invention is reflected in the limitation “wherein the tool body has a length and a radius and is cylindrical in shape” as recited by claim 1. A person of ordinary skill in the art, upon combining the disclosures of Hess Patent, the Ohmori Patent and the Nisimura Patent would not have a reasonable expectation of arriving at the subject matter of independent claim 1, which includes the limitation “wherein the tool body has a length and a radius and is cylindrical in shape.”

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against claims 1, 4, 5, 13 and 15-21 of the above-captioned application.

viii. No Legitimate Reason to Combine Hess, Ohmori and Nisimura

A proper rejection under Section 103 requires showing that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, the Examiner has failed to adduce a legitimate reason to combine the disclosures of the Hess Patent, the Ohmori Patent and the Nisimura Patent because the Hess Patent is non-analogous art and the combination is, on its face, an impermissible mosaic.

The Federal Circuit has ruled that there must be a legitimate reason to combine one or more disclosures and that a mosaic of prior art, employed to create a facsimile of the claimed invention, is not sufficient to establish a prima facie case of obviousness. Northern Telecom, Inc. v. Datapoint Corporation, 15 U.S.P.Q.2d 1321, 1323 (Fed. Cir. 1990). Likewise, it is a well-settled proposition that a patentable claim may consist of all old elements. Clearstream Wastewater Systems v. Hydro-Action Inc., 54 U.S.P.Q.2d 1185, 1189 (Fed. Cir. 2000).

In this case, the Hess Patent pertains to a bulky apparatus for improving the surface quality of optical components, which includes a working member (23) of a “compliant or elastically yieldable material” held between two arms (15) and (16), (Hess Patent, Figure 1, and col. 5, lines 21-28 and lines 55-68). As discussed above, a person of ordinary skill in the art would instantly realize that the apparatus disclosed by Hess is used for polishing an optical surface and is not a tool used for machining. Therefore, **the Hess Patent is non-analogous art.**

The Federal Circuit has also ruled that a prima facie case of obviousness cannot be established by modification of a prior art device in a manner that would obliterate an essential feature of the prior art device. McGinley v. Franklin Sports Inc., 60 U.S.P.Q.2d 1001, 1010-11 (Fed. Cir. 2001). In this case, modification of Hess’s optical surface polishing apparatus so that it becomes a “precision machining tool” in accordance with the presently claimed invention is a modification that would impermissibly obliterate an essential feature of Hess’s apparatus, namely, that it is a machine for polishing and not an apparatus for machining a surface. In view of the above facts, the Examiner has failed to demonstrate any legitimate reason for combining the subject matter disclosed by the Hess Patent with the subject matter disclosed by the Nisimura Patent and the Ohmori Patent.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against claims 1, 4, 5, 13 and 15-21 of the above-captioned application.

III. CONCLUSION

The Examiner has failed to establish a prima facie case of obviousness under 35 U.S.C. § 103(a) against claims 18 and 19 of the above-captioned application because neither the Hess Patent, the Ohmori Patent nor the Nisimura Patent teach or suggest, either alone or in combination, “the drum-shaped tool has a first groove formed therein on a first side” and

“the drum-shaped tool has a second groove formed therein on a second side,” respectively.


Furthermore, the Examiner has failed to establish a prima facie case of obviousness against Applicants claimed invention because the Examiner has failed to show that a person of ordinary skill in the art would have had a reasonable expectation of success of arriving at the invention recited by claims 1, 4, 5, 13 and 15-21 if the combination of Hess, Ohmori and Nisimura was made, and because the Examiner has failed to establish a legitimate reason to justify the combination of the Hess Patent, the Ohmori Patent and the Nisimura Patent.

For all of the above reasons, claims 1, 4, 5, 13 and 15-21 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below-signed attorney for Applicants.

Respectfully submitted,

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